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Five hundred and eighty-eighth Meeting.

December 10, 1867. — ADJOURNED STATUTE MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary read letters relative to exchanges; also a letter from Professor C. H. F. Peters, in acknowledgment of his election as an Associate Fellow of the Academy; and a letter from Henry S. Maine, in acknowledgment of his election as a Foreign Honorary Member.

The President called the attention of the Academy to the recent decease of Professor Bopp, of the Foreign Honorary Members.

On the motion of Dr. E. H. Clark, a committee was appointed to urge upon Congress the adoption of the decimal systems of weights and measures. Dr. E. H. Clark, Professor F. H. Storer, and Professor Horsford were appointed on this committee.

Professor F. H. Storer, the Librarian, moved that a committee be appointed to consider and report upon the meaning of the statutes which relate to the powers and duties of the Librarian and the Library Committee. In accordance with this motion the following committee was appointed: Professor Rogers, Mr. J. I. Bowditch, and Mr. O. Pickering.

Mr. Roland G. Hazard, of Peace Dale, Rhode Island, was elected an Associate Fellow in Class III., Section 1.

Five hundred and eighty-ninth Meeting.

January 14, 1868. — MONTHLY MEETING.

The CORRESPONDING SECRETARY in the chair.

The Corresponding Secretary announced the recent decease of Mr. Charles C. Jewett, of the Resident Fellows; of Rev. Chester Dewey, of Rochester, N. Y., of the Associate Fellows; and of M. Rayer, of Paris, of the Foreign Honorary Members.

Dr. C. T. Jackson exhibited to the Academy a series of lead-encased block-tin tubes or pipes for the conduction of water, manufactured by the Boston Lead Company, Shaw and Willard's patent.

" The first lot was made by placing two semicylinders of pure block-tin around a hollow core, or mandril, through which a current of cold water could be made to run, so as to keep the tin as cool as possible. The semicylinders of tin were also chilled in snow or pounded ice. When placed around the core, and held closely together by tongs, melted lead, at as low a temperature as it could be cast, was poured around the tin, and allowed to cool, the compound cylinder being eight inches long and six inches in diameter. Then, by means of a powerful hydraulic press, giving a pressure of 3,150 pounds per square inch, or between four and five hundred tons upon the ram or piston, the cylinder of lead and tin was forced out below, a mandril, or former, keeping the inner portion of the tube open and of a uniform size. When the thick cylinder was nearly driven out of its mould, the press was stopped, and a new casting was made upon the remaining metal; so that continuous and perfectly united tubes of any desired length were formed, and were wound up on a reel in a room below. By this method, it was thought, a pipe lined with pure block-tin surrounded by the more flexible lead could be produced; but it has been found that pipes made in this way charged the water which stood in them overnight with lead.

" Dr. Jackson was therefore called upon to make a series of analyses of the linings of many of these tubes, and discovered that the lining was composed of 22 per cent of lead and 88 per cent of tin, or an alloy. He was then invited to witness the operation of making the pipes, when every endeavor to prevent the penetration of the molten lead into the substance of the tin proved that it was impossible, so long as the molten lead was cast around the tin, — for the lead requires a temperature of 612° for its fusion, and tin only 442°; while the great mass of hot lead rendered the tin almost a paste, into which the lead readily penetrated. There being 170° difference between the melting-points of the two metals, it was suggested that, if the lead was cast first around an iron core, and, when cold enough, on withdrawing the core and casting in the tin, the difficulty might be remedied. This, the foreman of the works said, could be easily effected, and it was soon after done with entire success; for chemical analysis showed the tin lining of such pipes to be absolutely pure tin. By this improved process all the pipes now made at the Boston lead-works, and also at the New York works, are manufactured; and the public may rely on their producing a faultless water-pipe.

"It is also found that, by this improvement, the pipes can be made more rapidly than heretofore, and that a plug or compound cylinder for drawing may be cast thirteen inches long, which is a great advantage.

"A series of experiments were made to ascertain the action of distilled water and of Boston well-water on lead pipes, and on those made as first described, in which the tin had become alloyed with 22 per cent of lead; and it was found that a lead pipe in 24 hours yielded to distilled water 4·80 grs. of oxide of lead per gallon, and that a pipe lined with tin alloyed with 22 per cent of lead yielded to a gallon of the water 2·24 grs. of oxide of lead, while the pipe lined with pure tin yielded nothing to the water. When Boston well-water, containing 26 grs. of various saline matters per gallon, was substituted for distilled water, lead pipe, in 24 hours, yielded to it 2 grains of oxide of lead, and the pipe lined with tin alloyed with 22 per cent of lead yielded 1·865 grs. of lead to the water, the sulphates in the well-water protecting the lead to a considerable extent. The well-water of Waltham, which was very much less saline than Boston well-water, dissolved 0·8 gr. of oxide of lead from a pipe made of the tin alloyed with lead; this impregnation having taken place in a single night, or about 12 hours.

"It would seem from these researches, that the lead-encased tin pipe, as originally manufactured, is better than lead pipe, but is still objectionable as a water conduit, and much more so for more powerful solvents for lead, such as soda-water and beer; while the pipe, as now made, is as unobjectionable as pure block-tin pipe, and is actually cheaper than lead when purchased by the linear foot."

Five hundred and ninetieth Meeting.

January 29, 1868. — STATUTE MEETING.

The PRESIDENT in the chair.

Professor August De La Rive was elected a Foreign Honorary Member in Class I. Section 3, in place of the late Michael Faraday.